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ABSTRACT

The purpose of this study was to investigate the difference in attitude toward achievement in science between boys and girls in grade two and in grade five to see if differences reported for middle school students may apply to elementary students. The need for such research is based upon the growing awareness among teachers, parents, administrators, researchers, and scholars that males outnumber females in science courses and science careers. The subjects in the study were administered the Nyberg and Clark Attitudinal Scale and the Stanford Achievement Test during the spring of 1985. The data were analyzed using independent t-tests. The results of this study indicated that the elementary students in grades 2 and 5 did not exhibit any gender differences in achievement and attitudes toward science. It appeared that students in this study had not been negatively affected by their encounter with science instruction. This study seems to imply that the early and continued positive science experiences by students are necessary to avoid a negative attitude towards science in later years. (CW)

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An Investigation of the Differences in Attitude and Achievement Between Male and Female Second and Fifth Grade Science Students

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INTRODUCTION

Research has indicated a strong decline in the interest and achievement in science from students in middle school to high school students (Haladyna & Shaughnessy, 1982). Additionally, Cannon & Simpson (1985) stated that students lose interest in science as the school year progresses. Baker (1985) reported that even males and females with grades of A and B had negative attitudes toward science.

The negativism toward science has an effect upon students in selecting science as a career. Matyas (1985) stated that "women remain severely underrepresented in science careers" (p.75). Simpson and Oliver (1985) indicated that although females show general interest in the school environment, males are more highly motivated to achieve and have better attitudes towards science. Kahle, Matyas, and Cho (1985) found that boys more often than girls participated in extracurricular science activities, but they also found that girls generally had a more positive view of science if they have had more experiences in science.

Although cultural and social influences may contribute to the differences between males and females in science achievement and choice of science as a career, Treaguest (1980) suggested that one of the key educational/attitudinal factors affecting girls' enrollment and achievement in science is unequal science training and that girls do not avoid science experiences because of a lack of interest in them. At age nine, girls' desire for science experiences often exceeds the level expressed by the national mean (Kahle & Lakes, 1983).

Fennna (1980) reported that teachers value different qualities among boys and girls and consequently have different expectations in boys' and girls' performances in science. Kahle & Lakes (1983) found that when boys and girls are paired to do science experiments, the boys do most of the work while the girls watch. They felt that educational practices can alleviate this and other pervasive cultural differences.

STATEMENT OF THE PROBLEM

The purpose of this study was to investigate the difference in attitude toward and achievement in science between boys and girls in grades two and five to see if the differences for middle school students reported by Simpson and Oliver (1985) may apply to elementary students. The need for such research is based upon the growing awareness among teachers, parents, administrators, researchers and scholars that males outnumber females in science courses and science careers (Peterson, Kauchak, and Yaakobi, 1980), and this study was designed to see if gender difference in science interest and attitudes observed in middle school and high school may also apply to students in the elementary grades.

DEFINITIONS

For this study, "attitude toward science" was defined in terms of attitude as measured by the Nyberg and Clark Attitudinal Scale (Nyberg and Clark, 1979). "Achievement in science" was defined as a determination of the student's work in science as measured by the Stanford Achievement Test (Science Section) as discussed in Kelly, Madden, Gardner, and Rudman (1985). To designate sex and grade levels among the subjects, the following was used:

2 B = Second grade boys
2 G = Second grade girls
5 B = Fifth grade boys
5 G = Fifth grade girls

SAMPLE

The subjects of this study consisted of 129 second grade boys (N = 69) and girls (N = 60) and 154 fifth grade boys (N = 79) and girls (N = 75). The racial mix of blacks to

whites was comparable to the general population of the community. All subjects were students in self-contained classrooms randomly selected from 51 elementary schools in a southwest Alabama city.

PROCEDURE

The subjects in the study were administered the Nyberg and Clark Attitudinal Scale and the Stanford Achievement Test during the spring of the academic year 1984-85. The Nyberg and Clark Attitudinal Scale was administered followed by the Stanford Achievement Test. Both tests were administered in the morning. The data were analyzed using independent t-tests. No a priori level of significance was established.

RESULTS

The following results appear to be tenable as a result of the analyses:

Second Grade Boys and Girls

When comparing the 2 B mean scores (M = 20.85) on achievement with the 2 G mean scores (M = 20.10), the t-test revealed no significant difference (See Table 1).

Insert Table 1 about here

A comparison of the attitude mean scores of the 2 B group (M = 3.67) with the 2 G group (M = 3.74), indicated no significant difference (See Table 2).

Insert Table 2 about here

Fifth Grade Boys and Girls

The science achievement test resulted in mean scores of 45.58 for the 5 B group and 44.88 for the 5 G group. The t-test revealed no significant difference (See Table 3).

Insert Table 3 about here

The science attitude scale resulted in mean scores of 3.53 for the 5 B group and 3.62 for the 5 G group. The t-test revealed no significant difference (See Table 4).

Insert Table 4 about here

CONCLUSIONS

The results of this study indicated that the elementary students in grades 2 and 5 did not exhibit any significant gender differences in achievement and attitudes toward science. Therefore, studies indicating gender differences in secondary school and middle school do not seem to apply to elementary students; and it may be concluded that gender differences in attitude and achievement as observed by Simpson and Oliver (1985) and others probably commence after the elementary grades.

IMPLICATIONS

The results of this study indicate that there were no significant differences between the elementary boys' and girls' attitudes toward or achievement in science as a school subject. While other studies indicate gender differences in middle school (Simpson and Oliver, 1985) and high school (Haladyna and Shaughnessy, 1982), these younger students do not conform to that pattern. It seems, then, that the disparity of positive attitudes and equal achievement between female and male students originates after grade five. This being the situation, additional studies are urgently needed to investigate precise reasons for the changes which seem to occur from grade six upward. Areas which may lead to findings relevant to gender differences should include, but not be limited to: societal expectations; peer expectations; instructional techniques; instructional materials; teacher attitudes and teacher expectations. Investigations into these areas should focus primarily at the upper elementary and middle school levels. Upon the identification of the commencement point of disparity and factors contributing to it, action should be forthcoming to reform upper elementary and middle school science education as indicated and encourage and upgrade the achievement and attitudes of female science students.

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TABLE 1

Stanford Achievement Test, Science Section Data Analysis
for Second Grade Boys and Girls

Group	N	Mean	SD	df	t
Boys-2	70	20.85	2.820		
				127	1.5*
Girls-2	59	20.10	2.881		

TABLE 2

Nyberg and Clark Attitudinal Scale Data Analysis
for Second Grade Boys and Girls

Group	N	Mean	SD	df	t
Boys-2	69	3.6697	0.635	127	0.69*
Girls-2	60	3.7393	0.496		

TABLE 3

Stanford Achievement Test, Science Section Data Analysis
for Fifth Grade Boys and Girls

Group	N	Mean	SD	df	t
Boys-5	79	45.58	9.229		
				152	0.46*
Girls-5	75	44.88	9.561		

TABLE 4

Nyberg and Clark Attitudinal Scale Data Analysis
for Fifth Grade Boys and Girls

Group	N	Mean	SD	df	t
Boys-5	78	3.5294	0.598		
				151	-0.84*
Girls-5	75	3.6184	0.712		